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| 10/076,915      | 02/14/2002  | Anna Lee Tonkovich   | 13007B              | 1868             |

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EXAMINER

LEUNG, JENNIFER A

ART UNIT

PAPER NUMBER

1764

DATE MAILED: 11/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/076,915

Applicant(s)

TONKOVICH ET AL.

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 and 75-85 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-31 and 75-85 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 1-13-06.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 28, 2006 has been entered.

### ***Response to Amendment***

2. Applicant's amendment submitted on August 28, 2006 has been received and carefully considered. Claims 32-74 are cancelled. Claims 1-31 and 75-85 are active.

### ***Claim Objections***

3. Claims 24 and 26 are objected to because of the following informalities:

In claim 24, line 18: "•m" should be changed to --µm--.

In claim 26, line 2: "•m" should be changed to --µm--.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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4. Claims 1-4, 6-13, 15, 27-30, 75, 78, 79, 82, 83 and 85 are rejected under 35

U.S.C. 102(b) as being anticipated by Yamashita et al. (JP 2000-329490).

Regarding claims 1, 6, 8-10, 13, 15, 27, 28 and 30, Yamashita et al. (see FIG. 1a and 1b; Abstract; Machine Translation, and in particular, section [0011]) discloses a device and process of making the device (i.e., a laminated heat exchanger 3) for conducting a unit operation (i.e., heat exchange, e.g. heating, cooling), the process comprising:

stacking a plurality of shims (i.e., plates 1(1) to 1(n)) such that a continuous flow path is formed through the shims (i.e., as defined by aligned openings 2a, 2b, 2c, 2d, 2e), wherein the flow path extends in a direction that meets the recited definition of “substantially parallel to the shim thickness” (see FIG 1b); wherein the plurality of shims comprises at least three adjacent shims 1(1) to 1(n) through which the flow path is formed (see FIG. 1b), wherein a straight unobstructed line is present through the flow path in said at least three shims (see FIG. 1b); wherein the shims 1(1) to 1(n) are configured such that a unit operation (i.e., heat exchanging) can be performed on a fluid the flow path; wherein the flow paths defined by each of the aligned openings 2a, 2b, 2c, 2d, 2e do not connect or mix with one another, and wherein the device 3 is formed when the shims 1(1) to 1(n) are bonded to one another (e.g., by “weldbonding” of metal plates or by adhesive joining of plastic plates; section [0011]).

Regarding claims 2, 3 and 78, the flow path is formed by apertures 2a, 2b, 2c, 2d, 2e (see FIG. 1a, 1b), wherein the aperture may comprise a shape including circles, squares, stars (see section [0011]) or the frustoconical shape shown for openings 2b, 2c, 2d and 2e. For example, the flow path defined by the aligned openings 2a is cylindrical in shape (see FIG. 1a, 1b).

Regarding claim 4, as seen in FIG. 1a and 1b, the shims 1(1) to 1(n) are identical.

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Regarding claims 7 and 79, the flow path may comprise a static mixer, wherein the mixer comprises a structure comprising a helical pattern, a double helical pattern, spiral pattern or alternating spiral pattern (i.e., as defined by the shifted openings of adjacent shims; FIG. 6, 7).

Regarding claims 11, 12 and 75, Yamashita et al. discloses borders of the apertures in at least one of said shims comprising a circumference that is at least 20% populated by edge features (i.e., inner circumference of an opening **12b** comprising a saw tooth, FIG. 2; inner circumference of an opening **22b** comprising a wave configuration toothing, FIG. 3; see also sections [0012]-[0013]) and claim 7), and a smooth border in another of said shims (i.e., inner circumference of an opening **12a**, FIG. 2; inner circumference of an opening **22a**, FIG. 3).

Regarding claim 29, the device 3 is capable of at least two different unit operations (i.e., heating and cooling, since while one fluid is heated, the other fluid is inherently cooled).

Regarding claims 82 and 83, the flow path may comprise a metal film (i.e., see layers 44(1), 44(2)... 44(n-1) in FIG. 5).

Regarding claim 85, device 3 is formed of at least five shims **1(1)** to **1(n)**; see FIG. 1b.

Instant claims 1-4, 6-13, 15, 27-30, 75, 78, 79, 82, 83 and 85 read on the process and apparatus of Yamashita et al.

5. Claims 1-10, 13-16, 17, 21, 27-29, 30, 75, 76, 78, 79 and 85 are rejected under 35 U.S.C. 102(a) as being anticipated by Symonds (WO 01/35043).

Regarding claims 1, 6, 8-10, 13-15, 27, 28, 76, 78 and 85, Symonds discloses a device and a process of making the device (i.e., a stacked assembly **10**; FIG. 1) for conducting a unit operation (e.g., heat exchanging, reactions; page 1, second paragraph) comprising:

stacking a plurality of shims (i.e., discs **22**, at least five in number, within portion **11** of

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assembly 10; FIGs. 1 and 2) such that a continuous flow path is formed through the shims (i.e., as defined by aligned openings 29, between inlet 12 and outlet 13), wherein the flow path extends in a direction that meets the definition of “substantially parallel to shim thickness”; wherein the plurality of shims comprises at least three adjacent shims 22 through which the flow path is formed, and wherein a straight unobstructed line is present through the flow path in said three shims; wherein the unit operation is performed on a fluid in the flow path; wherein the flow path (i.e., defined by each aligned aperture 29) in said at least three shims 3 does not mix with any other flow paths (see FIGs. 1, 2), and wherein the device is formed by bonding the shims together (see page 6, second paragraph).

Regarding claims 2 and 3, the apertures 29 are triangular with rounded corners (see FIG. 2), thereby forming a flow path having a prismatic shape.

Regarding claim 4, the at least three adjacent shims 22 (FIG. 2) within the portion 11 of the stack 10 (FIG. 1) are identical.

Regarding claim 5, the same comments with respect to Symonds apply. Additionally, a catalyst may be placed in the flow path (i.e., as packed bed catalytic reactors; page 1, second paragraph; page 4, second to last paragraph; claim 26).

Regarding claims 7 and 79, the flow path may comprise a mixer, wherein the mixer comprises a structure having a helical pattern, a double helical pattern, a spiral pattern, or an alternating spiral pattern (i.e., as defined by the offset limbs; see claim 16).

Regarding claims 16, 17, 21, 29 and 30, in the case of a “packed bed catalytic reactor”, the fluid comprises at least a portion of a reaction composition. Also, a second fluid passes through a second flow path (i.e., defined by aligned apertures 26), wherein the second fluid is the

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heat exchange fluid, and wherein the fluid in the first flow path **29** and the fluid in the second flow path **26** do not mix.

Regarding claim **75**, the apertures may comprise waves or irregular shapes (i.e., like openings **156**; FIG. 14).

Instant claims 1-10, 13-16, 17, 21, 27-29, 30, 75, 76, 78, 79 and 85 read on the apparatus and process of Symonds.

***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 24-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamashita et al. (JP 2000-329490).

Regarding claims 24-26, the same comments with respect to Yamashita et al. apply. Yamashita et al., however, is silent as to the shims defining a flow path having a minimum dimension of 10  $\mu\text{m}$ , and a maximum dimension of 5000  $\mu\text{m}$ . In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a flow path having dimensions within the claimed range in the process of Yamashita et al., on the basis of suitability for the intended use and absent showing any unexpected results thereof, because it has been held that changes in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

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7. Claims 18-20, 22, 24-26, 77 and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Symonds (WO 01/35043).

Regarding claims 18-20, Symonds further discloses that the fluid in the flow path (i.e., defined by apertures 29) and the fluid in the second flow path (i.e., defined by apertures 26) are separated by a distance (i.e., see example described on page 6, third paragraph; also, see FIG. 2, wherein inner annulus 24 forms separation). Symonds, however, does not specifically disclose the claimed distance. In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select an appropriate separation distance between the fluids in the first flow path and the second flow path in the process of Symonds, on the basis of suitability for the intended use and absent showing any unexpected results thereof, because changes in size merely involves routine skill in the art, and it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233. In addition, it would have been obvious for one of ordinary skill in the art at the time the invention to select an appropriate pressure difference of the fluids in the first flow and the second flow path in the process of Symonds, on the basis of suitability for the intended use and absent showing any unexpected results thereof, because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claim 22, the flow paths may comprise staggered supports (i.e., as defined by the offset limbs; see claim 16).

Regarding claims 24-26 and 77, the same comments with respect to Symonds apply.



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Symonds, however, is silent as to the shims defining a flow path having a minimum dimension of 10  $\mu\text{m}$ , and a maximum dimension of 5000  $\mu\text{m}$ . In any event, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select a flow path having dimensions within the claimed range in the process of Symonds, on the basis of suitability for the intended use and absent showing any unexpected results thereof, because changes in size involve only ordinary skill in the art. *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Regarding claim 84, although Symonds is silent as to the catalyst forming the “packed bed catalytic reactor” comprising a catalyst metal on an oxide support, it would have been obvious for one of ordinary skill in the art at the time the invention was made to select such materials for the particulate catalyst in the process of Symonds, on the basis of suitability for the intended use thereof, because the Examiner takes Office Notice that particulate catalysts are commonly formed of such materials.

***Allowable Subject Matter***

8. Claims 23, 31, 80 and 81 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 23, the prior art does not disclose or adequately suggest the instantly claimed process comprising the forming of the device and the performing of a unit operation within the flow paths of the device, wherein the unit operation comprises at least two different unit operations including an exothermic reaction on a reaction composition that flows through

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the flow path and an endothermic reaction on a second reaction composition that flows through the second flow path.

Regarding claim 31, the prior art does not disclose or adequately suggest the instantly claimed process comprising the forming of the device and the performing of a unit operation within the flow paths of the device, wherein the unit operation comprises at least two different unit operations including heating by combustion within the flow path and reacting by steam reforming within the second flow path.

Regarding claims 80 and 81, the prior art does not disclose or adequately suggest the instantly claimed process comprising the forming of the device and the performing of a unit operation within the flow paths of the device, wherein the unit operation comprises at least two different unit operations using catalysts placed in both the flow path and the second flow path, respectively, wherein the catalysts within each flow path are different.

### ***Response to Arguments***

9. Applicant's arguments have been considered but they are moot in view of the new grounds of rejection, as necessitated by the amendment to the claims.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is (571) 272-1449. The examiner can normally be reached on 9:30 am - 5:30 pm Monday through Friday.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn A. Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jennifer A. Leung

November 6, 2006 *jal*

  
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